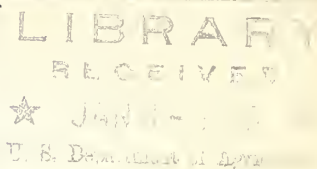


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SOME FUNDAMENTALS OF RABBIT BREEDING

An address by CHAS. E. KELLOGG, Biologist, Division of Fur Resources, Bureau of Biological Survey, delivered on November 24, at the annual convention of the American Rabbit and Cavy Breeder's Association, held in Pittsburgh, Pa., November 21-28, 1932

The breeding of livestock of any kind is a fascinating business, one that involves processes that, if guided in a productive channel, requires unusual skill. Indeed, one author has suggested that to produce an exceptional animal necessitates even greater ability than to paint a successful picture or to create a noteworthy statue. The artist transfers to canvas only the symbolism of the ideal that his great genius has conceived; the noted animal breeder must not only have an artist's conception of an animal, as both beautiful and useful, but must transmit his ideal to living, pulsing, life that is ever changing, that is never stable, that is gone for some unexplainable reason before the finishing touches can be affixed. Great, indeed, is the breeder that can formulate the artist's conception of animal perfection, transmit it into living flesh, and then preserve his ideal in stable form.

How few are the animal breeders, or even the rabbit breeders, who look upon their profession in this light! Many are but multipliers of animals with little preconception of where we are going or why. Some are carried from one extreme to another, overenthusiastic with this fad and that. The result is that the final product is a conglomeration of heritable factors that are at cross purposes.

Breeding Principles

There are certain fundamental principles of breeding evolved from years of scientific study and observation that it would be well for us to note carefully. At present the evidence indicates that environment has little or nothing to do directly with improvement of animal form. Proper care and management practiced over several generations have no cumulative effect on development of a better breed of rabbits. But good feeding and care do have the indirect value of providing a basis on which to select those individual rabbits that because of their heredity will respond most satisfactorily to such care and management.

If improvement in our rabbits is brought about, it must come chiefly through those factors of heredity that are transmitted through the germ cells. We should concentrate our efforts towards improvement on the manipulation and recombination into more desirable form of those factors that are located in the reproductive cells, the union of which is necessary in the creation of our higher forms of animal life. It has been found in recent years that hereditary processes are governed by laws just as rigidly as are phenomena in physics or in chemistry.

The primary principles of heredity are set forth in Mendel's law, so named from the Austrian monk who discovered these basic facts in the latter part of the last century. The far-reaching importance of his astounding discovery was not realized, however, until about 1900, only a little more than

30 years ago. During this brief period, however, this law has been intensely studied and the results obtained read like a romance! Though the theory of inheritance developed would seem fantastic in the extreme, it has been proved beyond a doubt by approach from many angles.

This theory in brief is: There are thousands of factors, or genes as they are scientifically called, that determine the inheritance of each individual. These are collected into groups like beads on a string, or into little packets. These groups are given the technical name of chromosomes, and their number is definite for each species. In the rabbit this number is 44, and is made up of 22 pairs. One of each pair comes from the father and the other from the mother. The peculiar thing is that each of these packets, or bodies, or chromosomes as they are called, in general, acts independently of the others. One can readily realize then the great variety of combinations that can be secured from rearrangement of these independent units.

The vast differences in size, color, and form now found in the various breeds of rabbits have resulted from various combinations of these groups, and the factors of which they are composed, into a more or less stable form. Frequent new combinations account for the off-type individuals cropping out within a breed and explain also the extreme variability noticeable in the newer breeds of rabbits as compared with older breeds that have eliminated most of the variable factors. These groups frequently exchange material or factors, and this regrouping permits various other recombinations. These variations are at once the hope and the despair of animal breeders. Without them there could be no chance of improvement; with them there is no assurance of fixing a type without the constant selection of desirable factors and the discarding of those that are undesirable.

There is another form of variation that is less common and less important from the rabbit-breeders' standpoint and yet has produced types of some of the most important commercial breeds. This is known as mutation, and an example is had in the rex type. Rex is recessive to the normal coat, and whenever it appears as such in the individual it always breeds true. Any breed can be "rexed" within three generations by proper matings, if a sufficient number of rabbits are produced. When individuals of the first generation are bred together 25 per cent of the offspring will be pure rex. If a white-rex breed is to be developed from a New Zealand white and a Castorrex mating, only about 1 out of 16 in the third generation will be a white rex. One of the breeding experiments conducted by the Biological Survey at the Rabbit Experiment Station at Fontana, California, has for its purpose the development of such a white-rex breed that has the meat qualities of the older and better established meat breeds of rabbits.

Woolly is another mutation in rabbits. This, however, unlike the rex is an undesirable trait. Woolly in rabbits is also a recessive, and consequently can easily be determined by test mating a woolly appearing rabbit (and therefore pure for this character) with any of the rabbits that one suspects has the woolly character. If any young rabbits produced from this mating show the woolly character, one can be certain that the mother is a carrier of woolly even though she herself does not show it. She should be taken out of the breeding group.

There are many other known independent unit factors in rabbits, but time will not permit discussing them. Any one interested in this phase of rabbit breeding can obtain innumerable books and pamphlets on the subject, among which are the extensive and thorough works of Dr. W. E. Castle and P. B. Sawin, both of Harvard University, Boston, Mass.

Efficiency Score Card

The Biological Survey this year developed in tentative form an efficiency score card to serve as a basis for selecting breeding does. A good rabbit breeder must have an excellent memory to remember the productive ability of most of his best does, even if he has a small group, but there is nothing equal to a definite written record to substantiate one's judgment when deciding which does to discard. Such a record also gives prospective buyers confidence in the business ability of a breeder and in the accuracy of his operations. By all means, rabbit raisers should keep some accurate though simple records of the performance of their breeding does. The larger the number of animals kept, the greater the necessity for records. This efficiency score card will be submitted to various breeders and breeding associations for criticism before it takes final form.

A brief summary of the tentative form is here presented. The four main divisions are:

1. Individuality
2. Temperament
3. Fecundity
4. Record of young raised

The first division considers the doe as an individual, not from a showman's standpoint but from that of its utility as a breeder. In arriving at the score such points have been emphasized as conformity to type, shape or form of body, proportionate size, constitution, quality of meat, and maximum development of natural flesh in the most desirable parts, and quality and fineness of fur in those breeds better adapted to fur production. In addition to these utility points, the raiser of any particular breed must select his animal in accordance with that breed's standard. Standard requirements in moderation are necessary for fixing a type, particularly so when the breed is new and the genetic factors are decidedly mixed. The restrictions are necessary for standardization, but permit me to say in all candor, and with no idea of destructive criticism, that breed enthusiasts should be careful not to over-emphasize the color of the toe nails, the length of the ear, or any particular color pattern to the extreme, for by such over-emphasis it will be found that the chosen breed will have little to recommend it other than fancy points. The overstressing of fancy points has led to discarding many a breed of livestock. The hard-headed, practical breeder who must make a living at rabbit raising will insist that his rabbits possess those points necessary for producing economically what the consuming public wants. If a certain breed has failed to develop such utility points, the practical rabbit raiser will select one that will, or he will even develop a breed himself that will satisfy trade requirements and be produced economically. And let me assure you that as competition becomes keener, these questions will receive more and more consideration.

The second main division of this efficiency score card considers the "temperamental qualities" of the doe--her disposition, her reaction towards frequent handling, her maternal qualities as determined by the method and manner of constructing the nest, the appearance of her young at birth, the quantity of milk she produces during the first week after kindling, and finally her attitude towards the young. The purpose of all this is to endeavor to obtain a definite measure for all those qualities that indicate whether a particular doe is efficient in her chief occupation.

Under the third division of this efficiency score card, "fecundity," we have endeavored to score the doe on the percentage of services required in relation to the number of litters produced in a year, and on the size of the litters. A perfect score is given the doe that consistently kindles either 7 or 8 young to each litter. A percentage discount is made for each number under 7, the fewer kindled the heavier the discount, and a smaller percentage cut is made for each litter above 8, because producing excessively large litters is not considered so great a fault as producing small litters, since the excess can be disposed of. Nevertheless, we have found, as also have all of you, that in litters of 7 or 8 the individuals are heavier and more vigorous than in larger litters, and we prefer these desirable qualities to mere numbers. A doe that produces and raises 7 young four times a year has done an excellent job and should not be required to do more. This production of good-sized litters is dependent largely on hereditary factors, and the most satisfactory method of control is to select and mate individuals whose genetic factors make for proper size of litters.

The last division of the tentative efficiency score card considers the number of young raised to weaning age and the weight of all litters produced during the year, and the average individual weight at weaning age. These are points in which as rabbit breeders we are primarily interested, for the rabbits are now approaching the age for marketing. Yet these final results are based on the three preceding, as may be readily seen. A doe that raises to 8 weeks of age an entire litter of 7 is graded at 100 per cent; the doe that raises a smaller litter (say 3) without losing any young is given a somewhat lower score; but a doe losing any young during the suckling period is given a pro rata cut for such failure. If a doe in one year has produced 80 pounds of 8-weeks-old rabbits, she has done her full duty; or if her young average 4 pounds at the same age, this indicates that she has the ability for heavy milk production, an essential characteristic for rapid growth of young.

The tentative efficiency score card as here outlined, it is considered, emphasizes the most important points necessary to proper selection of a breeding doe. These points depend on specific factors in the chromosomes of the germ cells ready to be transmitted to the progeny. This score card seems to afford an effective and accurate method of measuring these rather elusive points.

Progeny Test

Next I should like to consider two methods of selecting rabbits for breeding purposes, i.e., mass selection versus progeny-performance selection. In fact, it was to obtain a definite method of measuring values in the progeny of rabbits at the Rabbit Experiment Station that the efficiency score card was developed.

By mass selection is meant the selection of the young of individuals or the individuals themselves that have splendid production records. On the face of it this would seem to be an excellent breeding policy, yet practice has shown that once the animals are on a fair production basis the productivity of a rabbitry will actually decrease when mass selection is practiced. The higher the plane of development, the less efficient this procedure becomes. The explanation of such results is that a high-producing doe may herself carry the dominant genetic factors for high production, but together with these she may also carry recessive factors for low production which can not come to expression in the doe herself but may be transmitted to her offspring. High-producing ability in the doe and the transmittal of this ability to her progeny are two entirely different things.

A progeny test surmounts this difficulty. Briefly, a progeny test is the selection for breeding of those animals the majority of all of whose sisters are high and efficient producers. Not only is such a doe a high producer, but when properly mated she consistently passes these characteristics to her offspring. Her progeny may be safely considered to have these breeding factors in a more or less pure state. I would urge that all rabbit breeders adopt this progeny test for their rabbit-breeding operations.

Inbreeding

We receive many letters inquiring whether it is desirable to inbreed rabbits. By this is meant to mate animals that are very closely related. Our answer invariably has been that the average rabbit breeder should not attempt it for the following reasons:

The average breeder has not the ability to judge desirable qualities in his breeding rabbits, nor does he usually have the necessary knowledge of the previous history of his stock to know what results to expect.

Since the rabbits of the average breeder are usually of mixed inheritance, inbreeding of such animals will always result in a variety of progeny. Inbreeding knows no favorites. It will intensify poor qualities just as readily as it will good qualities.

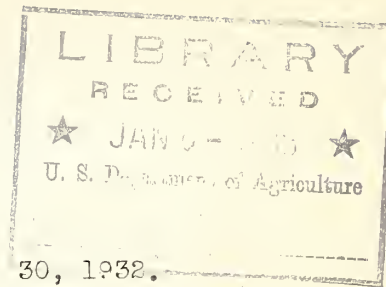
Inbreeding is not harmful in itself, but it is sure, rapid, and effective in analyzing the genetic structure and make-up of living forms. It will always remain a most potent procedure in developing and improving any breed of rabbits, and, in fact, no procedure other than close mating with rigid selection can be relied upon unfailingly to fix a type. Inbreeding is a two-edged sword, however, with which the average breeder of rabbits can not afford to play. It takes a courageous breeder and one with considerable financial backing to discard ruthlessly any and all undesirable forms.

Although it seems quite impossible at present, it would be a good thing for each rabbit breeders' association to finance in some way the inbreeding of two or three of the best strains of rabbits within the breed, with the idea ultimately of crossing these pure strains, and thereby developing a still better breed. This undertaking, however, would be too expensive for the individual breeder to attempt, and yet it has great potential value for each and every breeder. The breeders' association could well undertake the underwriting of such a policy for the benefit of all its members.



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UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Biological Survey
Washington, D. C.



December 30, 1932.

Memorandum to Employees of the Bureau
Using Personally Owned Automobile on a
Mileage basis in Performing Official Travel.

Attention is called to the attached memorandum issued by Dr. Stockberger relative to automobile mileage.

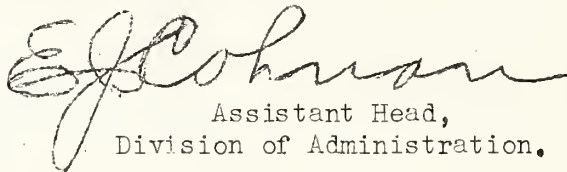
Beginning with expense vouchers submitted for the month of December, 1932, involving claim for compensation on a mileage basis for use of personally owned automobiles in performing official travel, each employee must, in accordance with this memorandum, claim mileage only from and to the corporate limits of his official station - that is, mileage from home or office of employee to the city limits of his official station, or from such city limits to his home or office should not be claimed, the speedometer reading for each trip involving departure from or return to official station being taken beginning and ending with the city limits of such official station.

To evidence to the General Accounting Office that no mileage at official station is involved in mileage statement (U.S.D.A. Form 22) there should be added to the certificate, which now appears at the bottom of said form, a statement reading as follows - I further certify that in each instance of above travel where departure from or return to official station is involved, mileage is claimed only from or to the corporate limits of such official station.

Should expense account for December have been stated by any employee but not forwarded to the Bureau before he receives this memorandum, it will not be necessary for him to restate his account but he may prepare a signed supplemental statement in duplicate to accompany such expense account, this supplemental statement to show as regards each trip involving travel from or to official station the mileage from the employee's home or office to city limits or from city limits to home or office, with request that such mileage be deducted in the settlement of employee's account. Should any employee have forwarded his December expense account to the Bureau before he receives this memorandum, he should at once prepare and transmit to the Bureau a supplemental statement as above indicated.

It is to be noted that the Comptroller General has reversed himself only as regards trips by personally owned automobile to points which he has heretofore regarded as at substantially post of duty for which no mileage could be allowed. The rules, therefore, for submitting statements involving mileage in personally owned automobile remain as stated in Bureau Memorandum Bi-1191 - that is, each use of personally owned automobile on a mileage basis in performing official travel must be supported by statement showing the economy and advantage to the Government resulting from such use of automobile.

It will also be noted that the attached memorandum deals principally with outstanding suspensions and disallowances on account of automobile mileage at substantially post of duty. Each employee of the Bureau involved in a suspension or disallowance of the General Accounting Office on account of automobile mileage of this kind will receive subsequent individual instruction as to procedure to be followed in an effort to obtain removal of such suspension or disallowance.


Assistant Head,
Division of Administration.

Attached.

UNITED STATES DEPARTMENT OF AGRICULTURE
DIRECTOR OF PERSONNEL AND BUSINESS ADMINISTRATION
WASHINGTON

December 8, 1932.

Suspended, Disallowed, or Unpresented Claims
for Automobile Mileage.

The Comptroller General's decision A-44782 of October 25 to the Secretary of Commerce in reversing prohibitions of mileage allowance for travel in personally owned automobiles during the 8 a.m. to 6 p.m. period of the same day opened the way for reclaim of disallowances or suspensions for this reason and for submission of claims not presented because not allowable under the former ruling. This decision, however, dealt only with travel within the specified 10-hour period. It indicated no remission of the embargo on mileage for trips on what was termed "headquarters duty", viz, within an indeterminate radius from the official station varying from two or three to fifty or sixty miles.

A-45611, of November 23, to the Attorney General, concludes as follows:

The decision of October 25, 1932, A-44782, authorized the payment of mileage for the use of an employee's privately owned automobile only for the distance traveled outside the limits of his official post of duty. In view thereof, and of the provisions of par. 3 of the Standardized Government Travel Regulations, supra, mileage for the use of privately owned automobiles will not hereafter be allowed from the employee's residence, but only from the limits of his post of duty. The decision in 11 Comp. Gen., 126, is modified accordingly.

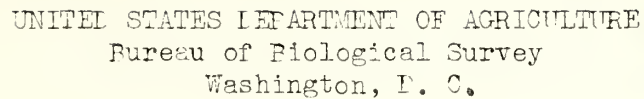
This latter decision seemingly removes the barrier on travel to nearby places, with the limitation, however, that the mileage must be reckoned from and to the corporate limits of the headquarters city or town. It is now, therefore, proper to seek removal of suspensions or disallowances under the 8 a.m. to 6 p.m. ruling, or the "headquarters duty" ruling or to submit claims hitherto withheld on this account. With the latter there should be explanation of the delayed submission. For disallowances repaid and recharged by the disbursing officer a claim should be forwarded through the bureau for direct settlement in the General Accounting Office. In other cases removal of the suspension or disallowance should be sought through the bureau accounting office.

It should be remembered, however, that in the reclaim mileage is to be reckoned only from and to the corporate limits of the headquarters city or town, and this must be affirmatively shown and former claims reduced accordingly. It will be well also to make a brief showing that the cost by any form of common carrier would have been at least as much as the mileage or that common carrier was not available.

W W Stockberger.

Director.

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MEMORANDUM TO EMPLOYEES OF THE BUREAU UNDER APPOINTMENT

Please fill out the form below giving full details if you receive any benefits from the Veterans' Administration or if you receive none so indicate. This form should be returned as soon as possible to this office.

✓ In charge,
Division of Administration.

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